



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/864,890	05/23/2001	Terje A. Skotheim	MT-0026.3	3358

7590 10/14/2003
SQUIRE, SANDERS & DEMPSEY LLP
TWO RENAISSANCE SQUARE
40 NORTH CENTRAL AVENUE
SUITE 2700
PHOENIX, AR 85004-4498

EXAMINER

WILLS, MONIQUE M

ART UNIT PAPER NUMBER

1746

DATE MAILED: 10/14/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/864,890

Applicant(s)

SKOTHEIM ET AL

Examiner

Wills M Monique

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 May 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

International Search Report

Skotheim U.S. Patent 5,462,566 cited as an "X" on the International Search Report does not when taken alone teach the instant invention. The reference teaches a polymer-lithium composite anode but is silent to a single ion-conducting layer wherein said single ion conducting layer and polymer layer are alternatively layered on the anodic material.

Gauthier et al. U.S. Patent 5,415,954 cited as an "X" on the International Search Report does not when taken alone teach the instant invention. The reference teaches lateral electrical contact outlets orthogonal to a lithium anode but is silent to a single ion-conducting layer wherein said single ion conducting layer and polymer layer are alternatively layered on the anodic material.

Information Disclosure Statement

The information disclosure statement(s) filed August 20, 2001 has/have been received and complies with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 .

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1,2,4-6 & 10-11 rejected under 35 U.S.C. 102(b) as being anticipated by Kawakami et al. U.S. Patent 5,824,434.

Kawakami teaches a method of making an anode material for lithium secondary cell (abstract). The method includes depositing a first anode active layer comprising lithium metal (col.2, lines 55-65) on a negative collector substrate (col. 6, lines 20-30) followed by depositing a multi-layer structure comprising 3 or more layers (col. 3, lines 20-25). At least one of the three or more layers comprise a single ion conducting layer and at least one of the layers comprises a polymer layer (col. 28, lines 5-11). The structure of the stacked layers is a multi-layer composed of a conductor layer, a semiconductor layer and an insulating (col. 3, lines 19-25). The insulating layer is a polymer layer (col. 27, lines 5-10). The structure can be four layers (col. 3, lines 20-25). The thickness of the multi-layered structure ranges between 1 to 10 microns (col. 28, lines 10-25). The conductive layer may include copper, aluminum and magnesium (col. 24, lines 35-45). The surface of the anodic material may be treated with nitrogen to

Art Unit: 1746

form a temporary protected layer formed into plasma by chemical deposition (col. 22, lines 62-68).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al. U.S. Patent 5,824,434, as applied to claim 1 above, in view of Bates U.S. Patent 5,569, 520.

Kawakami teaches a method of making a multi-structured anode as described hereinabove

Art Unit: 1746

Kawakami is silent to the first active layer having a thickness of 2 to 100 microns.

Bates teaches that it is well known in the art to employ lithium anodic films having a thickness of about 9 microns (col. 5, lines 5-15).

Kawakami and Bates are analogous art because they are from the same field of endeavor namely, fabricating thin lithium cells.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the thickness of the Kawakami anode to 9 microns as taught by Bates in to produce a thin battery suitable for particular electronic applications. Further, the skilled artisan recognizes that the thickness of the lithium metal is also determined by the amount of active materials needed to meet the capacity needs of the electronic application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 1746

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al. U.S. Patent 5,824,434, as applied to claim 1 above, in view of Bates U.S. Patent 5,314, 765.

Kawakami teaches a method of making a multi-structured anode as described hereinabove including employing an inorganic glass layer (col. 7, lines 60-68).

The reference does not expressly disclose a single ion conducting layers selected from inorganic lithium glass material of claim 7.

Bates teaches that a single ion-conducting layer of LiPON may be coated on the lithium anode of a thin film battery in order to lengthen battery life and improve overall performance of the cell (abstract)

Kawakami and Bates are analogous art because they are from the same field of endeavor namely, fabricating thin lithium cells.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to coat the anode of Kawakami with LiPON as taught by Bates, in order to lengthen battery life and improve overall performance of the cell.

Further, considering Kawakami teaches the employment of inorganic glass layers, it would have been obvious to one of ordinary skill to employ lithiated inorganic glass, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al. U.S. Patent 5,824,434, as applied to claim 1 above, in view of Ying U.S. Patent 6,277,514.

Kawakami teaches a method of making a multi-structured anode as described hereinabove including an insulating polymeric layer on the anode.

The reference is silent to the polymer layer comprising one or more of acrylate monomers selected from alkyl acrylates, glycol acrylates and polyglycol acrylates.

Ying teaches that it is well known to employ various acrylates in a protective coating for anodes (col. 13, lines 1-10) to improve ionconductivity of the cell (col. 14, lines 55-68).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the acrylates of Ying as the protective coating of Kawakami in order to improve ion conductivity of the cell.

Further, considering Ying teaches the employment of such protective layers on lithium anodes (col. 9, lines 65-68), it would have been obvious to one of ordinary skill

Art Unit: 1746

to employ lithiated inorganic glass, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al. U.S. Patent 5,824,434, as applied to claim 1 above, in view of Gozdz U.S. Patent 5,429,891.

Kawakami teaches a method of making a multi-structured anode as described hereinabove including a polymeric insulating layer comprising copolymers of polytetrafluoroethylene, polytrifluoroethylene, vinyl fluoride, vinylidene fluoride or dichlorodifluoroethylene.

The reference does not expressly disclose that the polymeric layer is cross-linked.

Art Unit: 1746

Gozdz teaches a polymeric film coating comprising a crosslinked hybrid of vinylidene fluoride and hexafluoropropylene to yield lithium batteries that are strong, flexible and function over a temperature range extending well above and below room temperature (col. 2, lines 42-57 and col. 3, lines 20-28).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ a crosslinked polymeric film of vinylidene fluoride and hexafluoropropylene in order to produce a polymeric layer that is strong, flexible and function over a temperature range extending well above and below room temperature.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al. U.S. Patent 5,824,434, as applied to claim 1 above, in view of Koksang U.S. Patent 5,387,479.

Art Unit: 1746

Kawakami teaches a method of making a multi-structured anode as described hereinabove including a collector substrate made stainless steel, titanium, nickel, copper, platinum or gold (col. 2, lines 30-35).

The reference does not expressly disclose the use of metal current collectors as foils.

Koksbang teaches that it is conventional to employ metal current collectors as foils for lithium metal anodes.

Kawakami and Koksbang are analogous art because they are from the same field of endeavor namely, fabricating thin lithium cells.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the metal current collectors of Kawakami in the form of metal foils, in order to decrease weight of the battery.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 12-14 and 16-20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al. U.S. Patent 5,824,434, as applied to claim 1 above, in view of Zhuang et al. The Reaction of Lithium with Carbon Dioxide Studied by Photoelectron Spectroscopy Surface Science, 1998.

Kawakami teaches a method of making a multi-structured anode as described hereinabove including surface treating the lithium metal with nitrogen, ammonia or nitrogen trifluoride gas. The nitrogen is activated to be formed into a plasma form by high frequency discharge. Therefore, forming a temporary protective layer on the anode. See column 22, lines 62-68 and column 23, lines 1-20.

The reference does not expressly disclose co-depositing in-situ the gas and lithium metal or the employment of carbon dioxide.

Zhang teaches that it is well known to treat lithium anodes with carbon dioxide to produce elemental carbon on the surface of the anode (page. 146) thus, increasing the conductivity of the anodic material.

Art Unit: 1746

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the gaseous materials of Kawakami with carbon dioxide, as taught by Zhang, in order to increase conductivity of the anode.

Further, considering that Kawakami teaches treating the anode with several gaseous materials (col. 9 , lines 65-68), it would have been obvious to one of ordinary skill to employ lithiated inorganic glass, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding to co-depositing in-situ, the lithium and gaseous material, according to the specification at page 26, lines 1-5, this may be accomplished by introduction of the gaseous material adjacent to the lithium source in the deposition chamber. Kawakami teaches depositing the lithium metal then forming a plasma gaseous layer. The reference does not expressly disclose forming both layers simultaneously. However, unless unexpected ameliorative results occur from simultaneous deposition, the method is obvious; the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results); In re Gibson , 5 USPQ 230 (CCPA 1930).

Conclusions

Art Unit: 1746

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Monique Wills whose telephone number is (703) 305-0073. The Examiner can normally be reached on Monday-Friday from 8:30am to 5:00 pm.

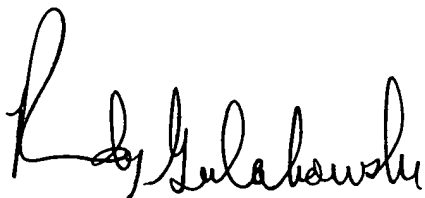
Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

If attempts to reach Examiner by telephone are unsuccessful, the Examiner's supervisor, Randy Gulakowski, may be reached at 703-308-4333.

The unofficial fax number is (703) 305-3599. The Official fax number for non-final amendments is 703-872-9310. The Official fax number for after final amendments is 703-872-9311.

Mw

09/13/03


RANDY GULAKOWSKI
SUPERVISORY PATENT EXAM
TECHNOLOGY CENTER 17C